UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,024	07/14/2006	Matthew T. Pretz	62829A	1125

109 7590 10/24/2008

The Dow Chemical Company
Intellectual Property Section
P.O. Box 1967
Midland, MI 48641-1967

EXAMINER	
NGUYEN, TAM M	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
10/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/586,024	PRETZ ET AL.	
	Examiner	Art Unit	
	TAM M. NGUYEN	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-10 and 13-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 8-10, and 13-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 9 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 9 is dependent on claim 7 which was canceled.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the broad recitation the residence time with the dehydrogenation reactor from about 0.5 to about 40 seconds and claim 1 recites the residence time with the dehydrogenation reactor from about 0.5 to about 10 seconds which is the narrower statement of the range/limitation.

The expression "the residence time with the dehydrogenation reactor from about 1 to about 12 seconds" in lines 2-3 of claim 3, renders the claim indefinite because such range is not within the range in claim 1 which recites "the residence time with the dehydrogenation reactor from about 0.5 to about 10 seconds."

The expression "the total average contact time" in lines 1-2 of claim 4, line 5 of claim 5, and in line 18 of claim 17 renders the claims indefinite because it is unclear if the total average contact time is the sum of the contact time of the catalyst in the reactor and in the separation device.

Claim 18 recites the limitation "the resulting hydrocarbon" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4-6, 8, 10, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Gartside et al. (US 5,254,788).

Gartside teaches a process for the production olefins (e.g., propylene) from light paraffinic feed (e.g., propane). The feed is charged concurrently with respect to a dehydrogenation catalyst into a reaction zone. The reaction zone is operated at temperature of from 900 to 1600° F (482 to 871° C) and at a pressure of from 10 to about 100 psig. The effluent from the reaction zone comprising of spent catalyst and an olefinic product is then passed into a separator wherein the spent catalyst is separated from the olefinic product. The spent catalyst is then passed into a regeneration zone to regenerate and combined with fresh catalyst and returned to the reaction. The residence time of the light paraffins in the reaction zone is from about 0.1 to

about 2 seconds. Gartside further discloses that the catalyst spends about 0.1 to about 2 seconds from passage through the rectangular orifice to discharge from the separator outlet. This means that the total contact time of the catalyst in the reaction zone and separator is about 0.1 to about 2 seconds. The feed is introduced to the dehydrogenation reactor at multiple points of entry. (See abstract; Figures 2-4; col. 4, lines 5-60; col. 7, lines 24-27; col. 10, lines 42-50; col. 12, lines 35-43; col. 12, line 54 through col. 13, line 3; col. 16, lines 45-56; Tables 2-4)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gartside et al. (5,254,788) as applied to claims 1 and 2 above further in view of Buonomo et al. (US 6,031,143).

The process of Gartside is as discussed above.

Gartside does not teach that the catalyst comprises gallium and earth-alkaline metal as claimed.

Buonomo teaches a process for a dehydrogenation catalyst comprising platinum, gallium, an earth-alkaline metal (e.g., potassium) and an alumina supporter. (See col. 2, lines 45-68)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Garside by utilizing the catalyst of Buonomo because Gartside teaches that a conventional catalyst can be used in the process. Also the catalyst of Buonomo is effective in the dehydrogenation.

Claims 9 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/56960 in view of Ruottu et al. (US 6,045,688).

Since the WO 01/56960 reference is equivalent to Hamper et al. (US 7,002,052), the examiner will use the Hamper et al. (US 7,002,052) reference here for convenience.

Hamper discloses a process of producing a vinyl aromatic compound such as styrene by contacting a C_{2-5} alkane (e.g., ethane) and a C_{2-5} alkyl-substituted aromatic compound (e.g.,

ethylbenzene) in a dehydrogenation catalyst in a reaction zone to produce a hydrocarbon product comprising an olefin and a C_{2-5} alkenyl-substitute aromatic (e.g., styrene). The catalyst is separated from the hydrocarbon product and passed into regeneration zone to regenerate and returned to the dehydrogenation reaction zone. Styrene is then recovered as a product. The olefin is then fed into an alkylation zone to contact with an aromatic compound such as benzene to produce alkylaromatic hydrocarbons (e.g, ethylbenzene) which is then passed to the dehydrogenation reaction zone to produce vinyl aromatic compounds. The alkane and the alkyl-substituted aromatic compound are conducted concurrently in the same dehydrogenation reactor. The dehydrogenation reaction zone is operated at a temperature of from 450° C to abut 530° C and at a pressure of from about 10 kPa to about 300 kPa. (See Figure 1, abstract; col. 3, line 25 though col. 4, line 42; col. 5, line 65 though col.8, line 14)

Hamper does not disclose the contact times of the catalyst in the dehydrogenation zone and in the separation zone, does not disclose that the hydrogenation of the paraffins and alkylaromatics are conducted in separated dehydrogenation reactors, and does not disclose the feeds' locations of the paraffins and alkylaromatics.

Ruottu discloses a dehydrogenation reactor wherein the residence time in the dehydrogenation reaction zone is in the range of 0.4 to 0.5 seconds and gas residence time in the separator (e.g., cyclone) is about 1 to 2 seconds. This would mean that the total contact time of the catalyst in the reaction zone and in the separator would be about 1.4 to 2.5 seconds. (See abstract; col. 3, line 66 through col. 4, line 13; col. 4 lines 45-50; col. 8, lines 7-9).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Hamper by utilizing the dehydrogenation reactor of Ruottu because such reactor has a high efficiency.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Hamper by utilizing two separated dehydrogenation reactors as claimed because it would be expected that the results would be the same or similar when feeding paraffins and alkylaromatics into two separated reactors or in a common reactor.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Ruottu by feed a paraffin compound at a relatively lower point of entry than an alkylaromatic compound because an alkylaromatic compound (e.g., ethylbenzene) are a larger compound compared to paraffins (e.g., ethane), so dehydrogenation reaction time would be different between the two compounds. It is within the level of one of skill in the art to feed paraffinic and alkylaromatic compounds at different locations to result in a high conversion including feed a paraffin compound at a relatively lower point of entry than an alkylaromatic compound.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAM M. NGUYEN whose telephone number is (571)272-1452. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tam M. Nguyen
Primary Examiner
Art Unit 1797

TN
/Tam M. Nguyen/
Primary Examiner, Art Unit 1797